General

Guideline Title

Guideline for surgical smoke safety.

Bibliographic Source(s)

Ogg MJ. Guideline for surgical smoke safety. In: 2017 Guidelines for Perioperative Practice. Denver (CO): Association of periOperative Registered Nurses (AORN); 2016 Dec. p. 477-506. [223 references]

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Note from the Association of periOperative Registered Nurses (AORN): The original guideline document provides guidance on surgical smoke safety precautions to help the perioperative team establish a safe environment for the surgical patient and team members through consistent use of control measures.

The health care organization should provide a surgical smoke-free work environment.
The perioperative team should evacuate all surgical smoke.
Perioperative team members should receive initial and ongoing education and competency verification on surgical smoke safety.
Policies and procedures for surgical smoke safety should be developed, reviewed periodically, revised as necessary, and readily available in the practice setting in which they are used.
Perioperative personnel should participate in a variety of quality assurance and performance improvement activities that are consistent with the health care organization's plan to improve understanding and compliance with the principles and processes of surgical smoke evacuation.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Any condition requiring surgical or other invasive procedure in which surgical smoke might be produced

Guideline Category

Prevention

Risk Assessment

Clinical Specialty

Nursing

Surgery

Intended Users

Advanced Practice Nurses

Hospitals

Nurses

Guideline Objective(s)

To provide guidance on surgical smoke safety precautions to help the perioperative team establish a safe environment for the surgical patient and team members through consistent use of control measures

Target Population

Perioperative personnel and patients undergoing surgical and other invasive procedures

Interventions and Practices Considered

1. Provisions for a surgical smoke-free work environment
2. Evacuations of all surgical smoke
3. Initial and ongoing education and competency verification on surgical smoke safety
4. Development and continued review of policies and procedures for surgical smoke safety
5. Participation in quality assurance and performance improvement activities

Major Outcomes Considered

- Surgical smoke exposure hazards (respiratory, chemical, carcinogenic, viral, bacterial)
- Symptoms associated with exposure to surgical smoke
- Smoke particle size, distribution, and concentration
- Chemical composition of surgical smoke
- Bacterial and viral content of surgical smoke

- Compliance with smoke evacuation
- Visibility of surgical fields
- Effectiveness of safety measures (use of filters, air suctioning, irrigation, exhaust ventilation, smoke evacuation, etc.)

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Evidence Review

A medical librarian conducted systematic searches of the databases MEDLINE®, CINAHL®, Scopus®, and the Cochrane Database of Systematic Reviews. Results were limited to literature published in English from January 1985 to November 2015. During the development of the guideline, the lead author requested additional articles that either did not fit the original search criteria or were discovered during the evidence appraisal process, and the lead author and the medical librarian identified relevant guidelines from government agencies and standards-setting bodies. Updated searches were completed in January 2016.

Search terms related to procedures included the subject headings and keywords *diathermy, cautery, laser, electrosurgery,* and *surgical procedures, operative*. Search terms and keywords related to by-products included *smoke, plume, fume, exhaust, mist, particulate matter, bioaerosols, aerosols, smoke evacuation, smoke extractor,* and *occupational air pollutants*.

Inclusion criteria were research and non-research literature in English, complete publications, and publication dates within the time restriction unless none were available. Excluded were non-peer-reviewed publications and literature on surgical smoke safety. Letters and editorials were excluded. Low-quality evidence was excluded when higher-quality evidence was available, and literature outside the time restriction was excluded when literature within the time restriction was available.

Number of Source Documents

In total, 274 research and non-research sources of evidence were identified for possible inclusion, and of these, 223 were cited in the guidance document. See Figure 1 in the original guideline document for a flow diagram of literature search results.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

I: Randomized controlled trial (RCT) or experimental study, systematic review of all RCTs

II: Quasi-experimental study, systematic review of quasi-experimental studies or combination of quasi-experimental and RCTs

III: Non-experimental studies, qualitative studies, systematic review of non-experimental studies,

combination of non-experimental, quasi-experimental, and RCTs, or any or all studies are qualitative

IV: Clinical practice guidelines, position or consensus statements

V: Literature review, expert opinion, case report, community standard, clinician experience, consumer experience, organizational experience (quality improvement, financial)

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Articles identified in the search were provided to the project team for evaluation. The team consisted of the lead author and two evidence appraisers. The lead author divided the search results into topics and assigned members of the team to review and critically appraise each article using the Association of periOperative Registered Nurses (AORN) Research or Non-Research Evidence Appraisal Tools as appropriate. The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score. The appraisal score is noted in brackets after each reference in the original guideline document, as applicable.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The collective evidence supporting each intervention within a specific recommendation was summarized, and the Association of periOperative Registered Nurses (AORN) Evidence Rating Model (see the "Rating Scheme for the Strength of the Recommendations" field) was used to rate the strength of the evidence. Factors considered in the review of the collective evidence were the quality of the evidence, the quantity of similar evidence on a given topic, and the consistency of evidence supporting a recommendation. The evidence rating is noted in brackets after each intervention in the original guideline document.

Rating Scheme for the Strength of the Recommendations

1: Strong Evidence: Interventions or activities for which effectiveness has been demonstrated by high quality evidence from rigorously-designed studies, meta-analyses, or systematic reviews, or rigorously-developed clinical practice guidelines

- Evidence from a meta-analysis or systematic review of research studies that incorporated evidence appraisal and synthesis of the evidence in the analysis
- Supportive evidence from a single well-conducted randomized controlled trial (RCT)
- Guidelines that are developed by a panel of experts, that derive from an explicit literature search methodology, and include evidence appraisal and synthesis of the evidence

1: Regulatory Requirement: Federal law or regulation

2: High Evidence: Interventions or activities for which effectiveness has been demonstrated by evidence from:

- Good quality systematic review of RCTs
- High quality systematic review in which all studies are quasi-experimental or a combination of RCTs

and quasi-experimental studies
High quality quasi-experimental study
High quality systematic review in which all studies are non-experimental or include a combination of RCTs, quasi-experimental, and non-experimental studies. Any or all studies may be qualitative.
High quality non-experimental studies
High quality qualitative studies
Good quality clinical practice guideline, consensus or position statement

3: Moderate Evidence: Interventions or activities for which the evidence has been demonstrated by evidence from:

Good quality systematic review in which all studies are quasi-experimental or a combination of RCTs and quasi-experimental studies
Good quality quasi-experimental study
High or good quality literature review, case report, expert opinion, or organizational experience

4: Limited Evidence: Interventions or activities for which there are currently insufficient evidence or evidence of low quality

Supportive evidence from a poorly conducted research study
Evidence from non-experimental studies with high potential for bias
Guidelines developed largely by consensus or expert opinion
Non-research evidence with insufficient evidence or inconsistent results
Conflicting evidence, but where the preponderance of the evidence supports the recommendation

5: Benefits Balanced with Harms: Selected interventions or activities for which the Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board is of the opinion that the desirable effects of following this recommendation outweigh the harms

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The Guideline for Surgical Smoke Safety has been approved by the Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board. It was presented as a proposed guideline for comments by members and others. The guideline is effective December 15, 2016.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score. The appraisal score is noted in brackets after each reference in the original guideline document, as applicable. Also see the original guideline document for the systematic review and discussion of evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Reduced exposure of perioperative personnel and surgical patients to hazardous surgical smoke
- Reduced risk of injury to health care personnel and surgical patients
- Refer to the original guideline document for additional discussion of potential benefits of specific interventions.

Potential Harms

Not stated

Qualifying Statements

Qualifying Statements

- These recommendations represent the Association's official position on questions regarding optimal perioperative nursing practice.
- No attempt has been made to gain consensus among users, manufacturers, and consumers of any material or product.
- Compliance with the Association of periOperative Registered Nurses (AORN) guideline is voluntary.
- AORN's recommendations are intended as achievable and represent what is believed to be an optimal level of patient care within surgical and invasive procedure settings.
- Although they are considered to represent the optimal level of practice, variations in practice settings and clinical situations may limit the degree to which each recommendation can be implemented.
- AORN recognizes the many diverse settings in which perioperative nurses practice; therefore, this guideline is adaptable to all areas where operative or other invasive procedures may be performed.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Mobile Device Resources

Resources

Staff Training/Competency Material

Tool Kits

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Safety

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016 Dec

Guideline Developer(s)

Association of periOperative Registered Nurses - Professional Association

Source(s) of Funding

Association of periOperative Registered Nurses (AORN)

Guideline Committee

Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board

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Financial Disclosures/Conflicts of Interest

No financial relationships relevant to the content of this guideline have been disclosed by the authors, planners, peer reviewers, or staff.

Guideline Status

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This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available to subscribers from the Association of periOperative Nurses Web (AORN) site .

Print copies: Available for purchase from the AORN Web site .

Availability of Companion Documents

The following is available:

> Evidence table. Guideline for surgical smoke safety. 2016 Dec. 65 p. Available from the Association of periOperative Nurses (AORN) Web site .

Additional implementation tools, including online learning modules, videos and community discussions, are available from the AORN Web site . A tool kit is also available from the AORN Web site .

Documents related to the evidence rating model, hierarchy of evidence, and expanded appraisal tools are available from the AORN Web site .

In addition, an AORN Guidelines for Perioperative Practice eBook mobile app is available from the AORN Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on March 7, 2017. The information was not verified by the guideline developer.

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